

AIRCRAFT CIRCULARS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 183

HEINKEL HE 70 COMMERCIAL AIRPLANE (GERMAN)
A Seven-Seat Cantilever Low-Wing Monoplane

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A Seven-Seat Cantilever Low-Wing Monoplane

The Ernst Heinkel Flugzeugwerke in Warnemuende, Germany, recently brought out the first European high-speed commercial airplane. This very interesting design was developed for the German Luft Hansa and will fly on their main routes. The new Heinkel is a cantilever monoplane of the low-wing type with accommodations for seven persons. Both landing gear and tail skid, as well as the glycol radiator are retractable.

Fuselage.-- The monocoque all-dural fuselage has an oval section and shows a remarkably clean design. (Figs. 1, 2, and 3). It has circular frames and longerons running through the whole body, so that no structural part projects into the spacious cabin. Only countersunk rivets were used for the dural planking and no rivet row can be seen on the outside.

Non-shatterable curved glass is used for all the windows and the panes conform exactly with the surface of the fuselage. The same applies to a wide door located on the right-hand side, where even a countersunk door handle has been provided. (Figs. 4 and 5).

The engine bed is mounted on the forward frame and can be removed quickly by loosening four bolts. A fire-proof, oil-tight bulkhead with asbestos protection is situated in front of the pilot's compartment, the seat being slightly higher, so that the pilot has an excellent view in all directions. The seat can be adjusted vertically when flying, while a horizontal regulating device may be adjusted on the ground.

The pilot's cabin has a streamline cover sliding to the rear under slight pressure. The side walls of the

*From information furnished by the manufacturers, the Ernst Heinkel Flugzeugwerke, G.m.b.H., Warnemunde, Germany, and the Luftwacht, of March 1933.

pilot's cabin were designed partly as windows and the left side can be turned down, permitting easy access. However, the main entrance for the crew, consisting of pilot and radio operator, is on the starboard side, where a large door is located above the wing root. This door has a bull's-eye, and a similar window is installed in the opposite side of the fuselage.

The seat for the radio operator is placed close behind and on the right-hand side of the pilot's seat, providing excellent communication for the crew and enabling the radio operator to watch the instrument board, etc. A complete radio set with transmitter and receiver is installed in a small compartment at the right of and somewhat below the instrument board, just in front of the operator's seat.

An additional folding passenger's seat has been provided in the rear of the pilot. A bulkhead shuts off the operator's compartment from the cabin behind it. This bulkhead has a draftproof slide window, which can be opened from the cabin, as well as from the pilot's compartment.

Great care has been taken to prevent drafts entering the passengers' cabin, which has accommodations for four persons, two facing forward and two backward. Very comfortable chairs covered with blue leather have been installed. All the chairs are provided with head rests and arms. The walls are covered with plywood and are painted blue, corresponding well with the leather upholstery of the chairs. The cabin is free from noticeable vibrations and is very quiet. A wide window is located at the side of each seat, thus affording an excellent view of the landscape. Both forward windows can be opened easily and all are sufficiently large to be used as emergency exits. The cabin is well ventilated and heated and has an adjustable air flap at the side of each seat.

A baggage compartment is located behind the cabin and is closed at the rear by a bulkhead with a manhole, which can be locked quickly and which allows easy access to the rear end of the fuselage.

Wing.— The cantilever wing, with diminishing chord, thickness and curvature, has a slightly negative V - shape at the root. It was designed as a unit and has two box spars with spruce flanges and plywood webs. The ribs are spaced closely and the wing is entirely covered with ply-

wood to increase its torsional rigidity. The spars are inserted in two cut-outs in the fuselage and fastened by a number of bolts. Two fuel tanks are placed in the wing near the fuselage and may be removed easily. The spars running through the fuselage are protected in such a way that no damage can be caused by the passengers.

Ailerons of the conventional type are used.

Tail surfaces.- Similar to the wing, the cantilever stabilizer and elevator have an elliptical contour. Structurally they are built up in the same way as the wing, i.e. of wooden spars and ribs with plywood planking.

The fin and stabilizer are rigidly secured to the fuselage, and an auxiliary surface on the elevator is used for trimming. This auxiliary surface is easily adjustable from the pilot's seat by means of a hand lever.

Landing gear.- The problem of retraction has been solved in a very ingenious manner, so that the wheels will be housed entirely by the wings. The mechanism is such, that the wheels are attached to a supporting strut sliding on a rail into the wing at its free end. By moving the free end of this strut, the wheel is drawn into the wing by a cable.

Contrary to some other designs, this arrangement allows the use of a normal shock-absorber strut with great travel. The cut-outs in the wing are closed automatically after lifting the wheels and a signalling mechanism shows the position of the wheels. Compressed oil in cylinders with pistons is used for the retracting mechanism. (Figs. 6 and 7).

The radio operator normally looks after the wheels, though the hand lever has been installed in such a way that the pilot can reach it easily. The wheels are equipped with brakes and have tires 900 X 200 mm (35.43 in. X 7.87 in.).

The tail skid has an oleo shock absorber and is withdrawn into the tail together with the landing gear automatically by means of hydraulic force.

Power plant.- The Heinkel He 70 is powered by a B.M.W. VI engine without gear, which yields a maximum output of 630 hp at 1600 r.p.m. Glycol cooling is provided and the

radiator may be retracted into the fuselage by means of a lever.

The regular fuel tanks have a capacity of 430 liters (114 gal.). When used as a freight airplane, an additional tank containing 70 liters (18.5 gal.) will be placed in the fuselage.

Instruments and equipment.- Complete navigation and engine-control instruments and a full set of blind-flying instruments are provided.

CHARACTERISTICS

485/630 hp. BMW VI Engine

Dimensions:

Length, over all	11.5 m	37.73 ft.
Height	3.1 m	10.17 ft.
Span	14.8 m	48.56 ft.
Wing area	36.5 m ²	392.88 sq.ft.

Weights:

Weight empty	2300 kg	5060 lb.
Useful load	1010 kg	2222 lb.
Payload	500 kg	1100 lb.
Gross weight	3310 kg	7282 lb.
Wing loading	92.4 kg/m ²	18.93 lb./sq.ft.
Power loading	5.4 kg/hp	11.74 lb./hp.
hp. per unit area	17.3 hp/m ²	1.63 hp./sq.ft.

Performances:*

Maximum speed (at 630 hp.)	362 km/h	224.94 mi./hr.
Cruising speed (at 485 hp.)	326 km/h	202.57 mi./hr.
Landing speed	110 km/h	68.35 mi./hr.
Rate of climb:		
0 - 1000 m (3280 ft.)		3.4 min.
0 - 2000 m (6560 ft.)		7.1 min.
0 - 3000 m (9840 ft.)		11.5 min.
0 - 4010 m (13,120 ft.)		17.0 min.
0 - 5000 m (16,400 ft.)		25.4 min.
Service ceiling	5700 m	18,700 ft.
Climbing speed at sea level	5.4 m/s	17.7 ft./sec.
Climbing speed at 5000 m	1.5 m/s	4.9 ft./sec.

*All the flights were made with the same propeller adjustment.

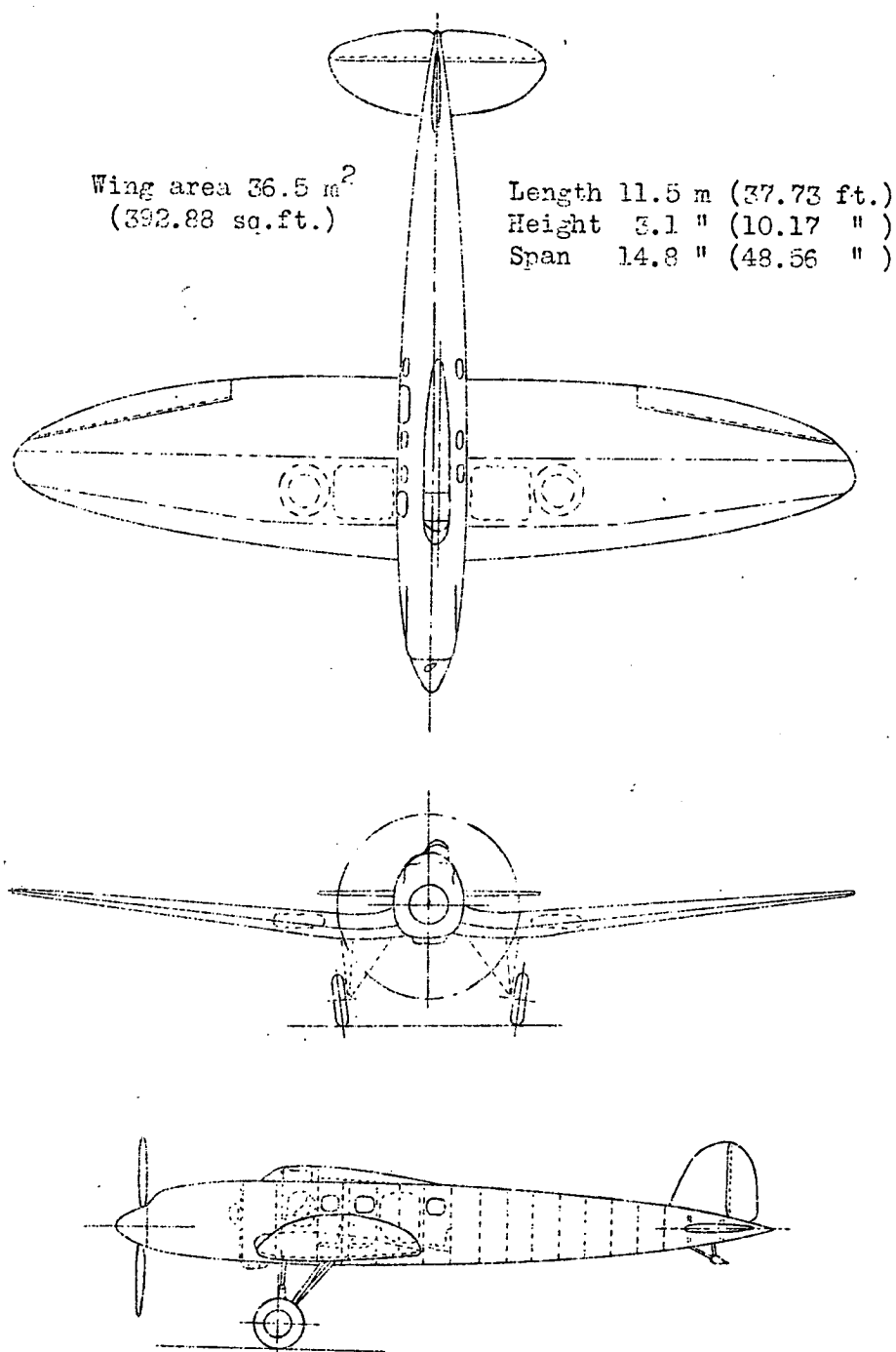


Figure 1.-General arrangement drawing of the Heinkel He 70 airplane.



Figure 2.-Three-quarter rear view of the Heinkel He 70 commercial airplane.

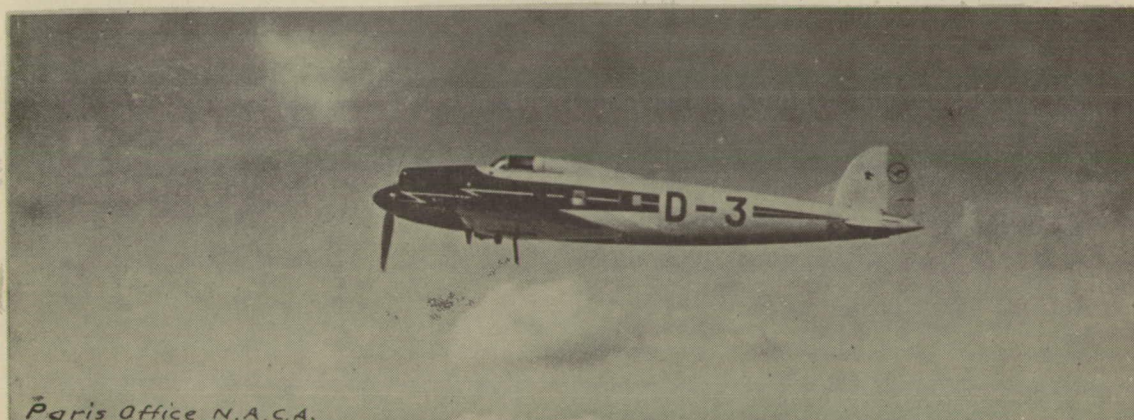


Figure 3.-The Heinkel He 70 in flight with landing gear drawn up.

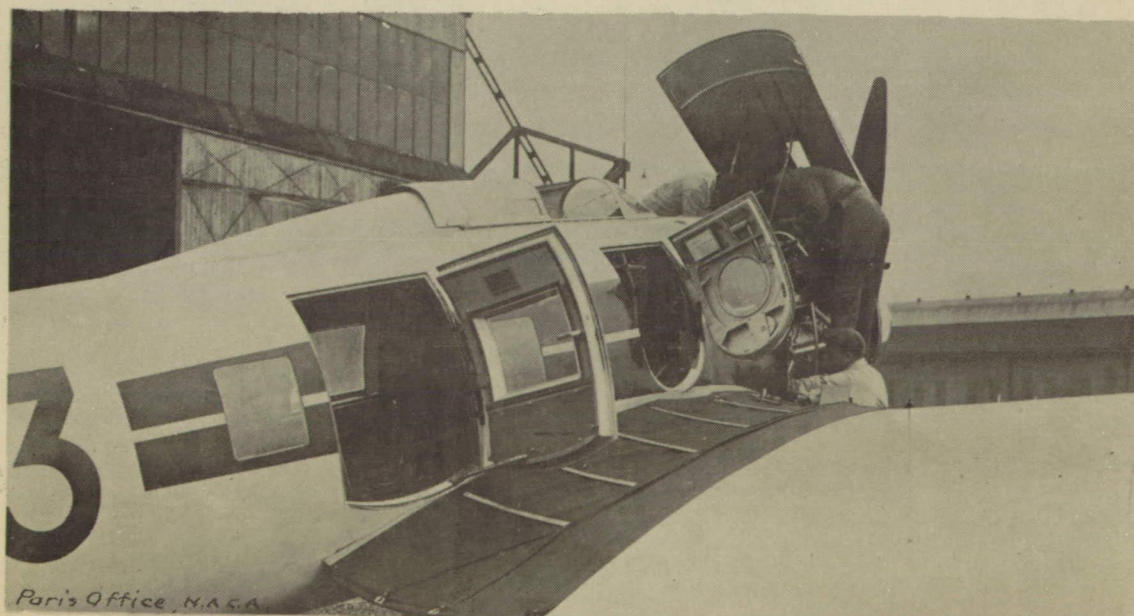


Figure 4.-Close-up view showing doors to cabin and cockpit.

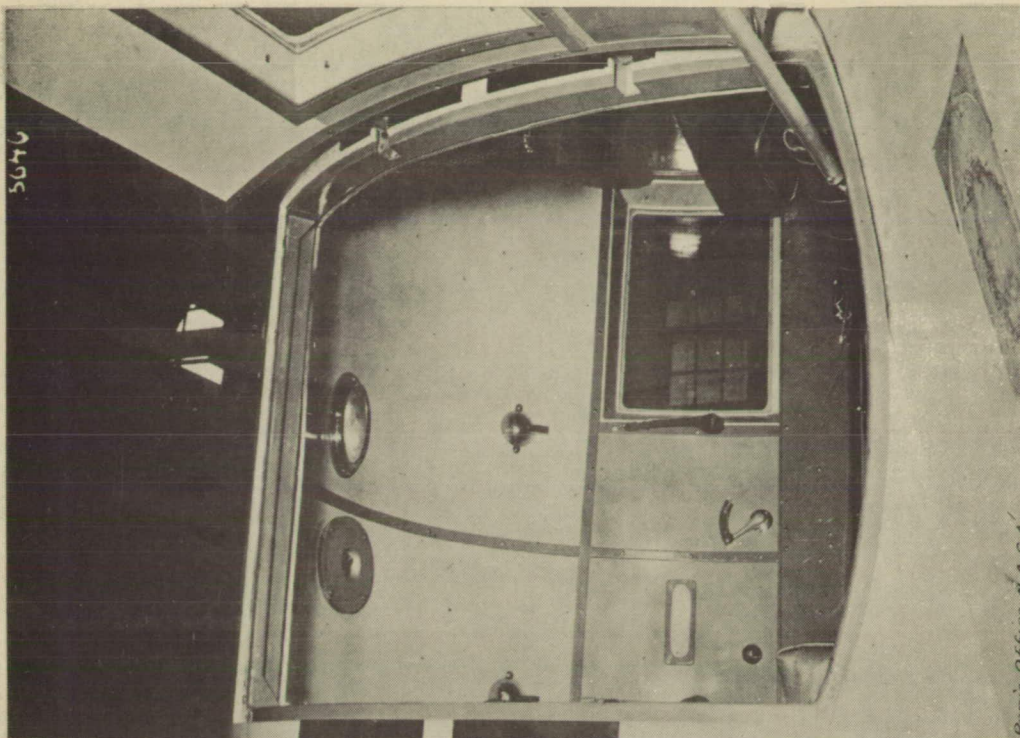


Figure 5.- Close-up view of cabin of
He 70 airplane.



Figure 6.-

Landing
gear in
position
for
landing
showing
openings
in wing.



Figure 7.-

Wheels
being
raised
in
flight.